

WHAT IS CLAIMED IS:

1. An electronic apparatus comprising:
  - a main body having a housing mounting parts including a plural number of electronic parts therein;
  - a display device having a housing;
  - a keyboard;
  - a heat-receiving member, being thermally connected with a semiconductor element as a heat generating member among said electronic parts, and having a first flow passage in which a liquid flows through;
  - a heat-dissipating member, being disposed on a wall of at least one of said housings of said main body and said display device, so as to dissipate heat therefrom into an outside air atmosphere, and having a second flow passage in which the liquid flows through;
  - a tube for connecting said first flow passage of said heat-receiving element and said second flow passage of said heat-dissipating element; and
  - a heat transfer device including therein a liquid circulator for circulating said liquid through said first and second flow passages between said heat-receiving element and said heat-dissipating element, wherein said liquid circulator produces a liquid circulating flow rate so that a difference between a maximum temperature and a minimum temperature of said circulating liquid at least in said first and second flow passages is not greater than a difference between an upper limit temperature of said heat generating member and an outside air temperature of the electronic apparatus.

2. An electronic apparatus according to claim 1, wherein the liquid circulating flow rate provided by said liquid circulator is at least 120 $\mu$ L/sec.
3. An electronic apparatus according to claim 2, wherein the liquid circulating flow rate provided said liquid circulator is not more than 1,200  $\mu$ L/sec.
4. An electronic apparatus according to claim 1, wherein said display is pivotally supported on said main body and a portion of said tube is made of a flexible tube.
5. An electronic apparatus according to claim 1, wherein said liquid circulator has a thickness less than a height of said main body.
6. A liquid cooling system for use in an electronic apparatus having a heat generating member, comprising:
  - a heat-receiving member being thermally connected with said heat generating member and having a first flow passage in which a liquid flows through;
  - a heat-dissipating member, being disposed on a wall of the electronic apparatus so as to dissipate heat into an outside air atmosphere, and having a second flow passage in which the liquid flows through;
  - a tube for connecting between said first flow passage of said heat-receiving element and said second flow passage of said heat-dissipating element; and
  - a heat transfer device including therein a liquid circulator for circulating said liquid through said first and second flow passages between said heat-receiving

element and said heat-dissipating element, wherein said liquid circulator produces a liquid circulating flow rate so that a difference between a maximum temperature and a minimum temperature of said circulating liquid at least in said first and second flow passages is not greater than a difference between an upper limit temperature of said heat generating member and an outside air temperature of the electronic apparatus.

7. A liquid cooling system according to claim 6, wherein the liquid circulating flow rate provided by said liquid circulator is at least 120 $\mu$ L/sec.

8. An electronic apparatus according to claim 7, wherein the liquid circulating flow rate provided said liquid circulator is not more than 1,200  $\mu$ L/sec.

9. An electronic apparatus comprising:  
a main body having a housing mounting parts including a plural number of electronic parts therein;  
a display device having a housing;  
a keyboard;  
a heat-receiving member, being thermally connected with a semiconductor element as a heat generating member among said electronic parts, and having a first flow passage in which a liquid flows through;  
a heat-dissipating member, being disposed on a wall of at least one of said housings of said main body and said display device, so as to dissipate heat therefrom into an outside air atmosphere, and having a second flow passage in which the liquid flows through;

a tube for connecting said first flow passage of said heat-receiving element and said second flow passage of said heat-dissipating element; and

a heat transfer device including therein a liquid circulator for circulating said liquid through said first and second flow passages between said heat-receiving element and said heat-dissipating element, wherein said liquid circulator produces a liquid circulating flow rate so that at least 10% of a sum of a temperature difference between said semiconductor element and said heat receiving element and a temperature difference between said heat-dissipating element and an outside air temperature of said electronic apparatus is obtained.

10. An electronic apparatus according to claim 9, wherein the liquid circulating flow rate provided by said liquid circulator is at least 120 $\mu$ L/sec.

11. An electronic apparatus according to claim 10, wherein the liquid circulating flow rate provided said liquid circulator is not more than 1,200  $\mu$ L/sec.

12. An electronic apparatus according to claim 9, wherein said display is pivotally supported on said main body and a portion of said tube is made of a flexible tube.

13. An electronic apparatus according to claim 9, wherein said liquid circulator has a thickness less than a height of said main body.

14. A liquid cooling system for use in an electronic apparatus having a heat generating, comprising:

a heat-receiving member being thermally connected with said heat generating member and having a first flow passage in which a liquid flows through;

a heat-dissipating member, being disposed on a wall of the electronic apparatus so as to dissipate heat into an outside air atmosphere, and having a second flow passage in which the liquid flows through;

a tube for connecting between said first flow passage of said heat-receiving element and said second flow passage of said heat-dissipating element; and

a heat transfer device including therein a liquid circulator for circulating said liquid through said first and second flow passages between said heat-receiving element and said heat-dissipating element, wherein said liquid circulator produces a liquid circulating flow rate so that at least 10% of a sum of a temperature difference between said heat generating element and said heat receiving element and a temperature difference between said heat-dissipating element and an outside air temperature of the electronic apparatus is obtained.

15. A liquid cooling system according to claim 14, wherein the liquid circulating flow rate provided by said liquid circulator is at least 120 $\mu$ L/sec.

16. An electronic apparatus according to claim 15, wherein the liquid circulating flow rate provided said liquid circulator is not more than 1,200  $\mu$ L/sec.

17. An electronic apparatus comprising:

a main body having a housing mounting parts including a plural number of electronic parts therein;

a display device having a housing;

a keyboard;

a heat-receiving member, being thermally connected with a semiconductor element as a heat generating member among said electronic parts, and having a first flow passage in which a liquid flows through;

a heat-dissipating member, being disposed on a wall of at least one of said housings of said main body and said display device, so as to dissipate heat therefrom into an outside air atmosphere, and having a second flow passage in which the liquid flows through;

a tube for connecting said first flow passage of said heat-receiving element and said second flow passage of said heat-dissipating element; and

a heat transfer device including therein a liquid circulator for circulating said liquid through said first and second flow passages between said heat-receiving element and said heat-dissipating element, wherein said liquid circulator produces a liquid circulating flow rate so that a difference between a temperature of said liquid flowing from said heat-dissipating element and a temperature of said liquid flowing from said heat-receiving element in the liquid circulating in at least said first and second flow passages is not greater than a difference between a temperature of said heat generating member and an outside air temperature of the electronic apparatus.

18. An electron apparatus according to claim 17, wherein the liquid circulating flow rate provided by said liquid circulator is at least 120 $\mu$ L/sec.

19. An electronic apparatus according to claim 18, wherein the liquid circulating flow rate provided said liquid circulator is not more than 1,200  $\mu$ L/sec.

20. An electronic apparatus according to claim 17, wherein said display is pivotally supported on said main body and a portion of said tube is made of a flexible tube.

21. An electronic apparatus according to claim 17, wherein said liquid circulator has a thickness less than a height of said main body.

22. A liquid cooling system for use in an electronic apparatus having a heat generating member, comprising:

a heat-receiving member being thermally connected with said heat generating member and having a first flow passage in which a liquid flows through;

a heat-dissipating member, being disposed on a wall of the electronic apparatus so as to dissipate heat into an outside air atmosphere, and having a second flow passage in which the liquid flows through;

a tube for connecting between said first flow passage of said heat-receiving element and said second flow passage of said heat-dissipating element; and

a heat transfer device including therein a liquid circulator for circulating said liquid through said first and second flow passages between said heat-receiving

element and said heat-dissipating element, wherein said liquid circulator produces a liquid circulating flow rate so that a difference between a temperature of said liquid flowing from said heat-dissipating element and a temperature of said liquid flowing from said heat-receiving element in the liquid circulation in at least in said first and second flow passages is not greater than a difference between a temperature of said heat generating member and an outside air temperature of the electronic apparatus.

23. A liquid cooling system according to claim 22, wherein the liquid circulating flow rate provided by said liquid circulator is at least  $120\mu\text{L}/\text{sec}$ .

24. An electronic apparatus according to claim 23, wherein the liquid circulating flow rate provided said liquid circulator is not more than  $1,200\mu\text{L}/\text{sec}$ .